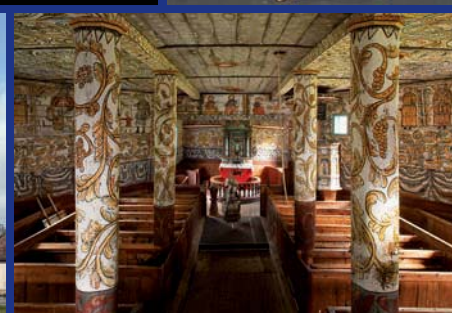
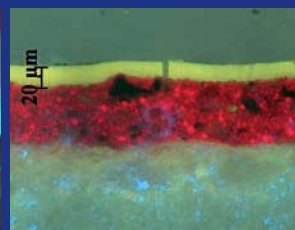
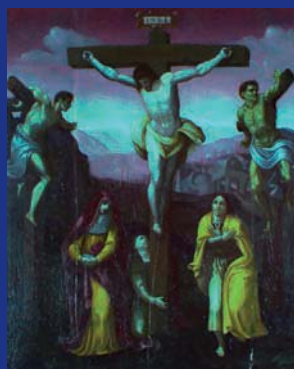


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8th European Symposium on Religious Art, Restoration & Conservation Proceedings book



Edited by

Claudia Pelosi, Giorgia Agresti, Luca Lanteri and Cetty Parisi

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The Processional cross of Saint Denis, radiographic image.

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and Cetty Parisi**

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INTRODUCTION

European Symposium on Religious Art Restoration and Conservation is a touring conference which is held in European towns in different countries. We are honoured to get trust of Dr. Iulian Rusu, the conference founder and father, and to be able to organize it in Viterbo, the town of the Popes.

The University of Tuscia and in particular the Department of Economics and Management assumed the organization of the 8th edition of the symposium from the Slovakian town Trnava where the 7th year of the conference took place.

The 8th edition of the conference is held in the Rectorate of University of Tuscia – Viterbo, Italy. Dates are 26th, 27th and 28th May 2016.

The conference develops the topics of socio-spiritual values of the religious art, diagnostics, conservation and restoration of religious cultural heritage and sacral sights in the light of tourist trade marketing. The religious art is part of cultural and spiritual heritage, and its preservation for the further generations involves wide multidisciplinary approaches. The interaction between tangible and intangible aspects of the religious art has recently been bringing together, thanks to plenty of interdisciplinary studies. Several specialists such as historians, theologians, art historians, conservators, media and marketing communicators, representative of churches, scientists are involved in developing the topics traditionally covered in the conference.

At Viterbo conference, forty-one papers in the three thematic areas are presented.

Each submitted paper was revised by two reviewers chosen between the eleven Reviewers listed in the following page. Reviewers were chosen according to their specific disciplinary area in relation to the topics.

In each paper, surname and name of corresponding author is highlighted by underlining, only in case of multiple authors.

We are very happy for the wide participation of colleagues from several countries and for covering all topics.

We are very grateful to Prof. Alessandro Ruggieri, Rector of University of Tuscia, for hosting the conference sessions in the Great Hall of the Rectorate and to Viterbo's Diocese for hosting the social events in the Papal Palace.

We are very grateful to our sponsor **Gentili srl** *Ristrutturazione e Restauro Monumentale dal 1863*, for the contribution to print this volume and for the welcome kit. We thank also the sponsor **Kyo Cleaning** for printing the conference posters.

Claudia Pelosi

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**B- DIAGNOSTICS, CONSERVATION AND RESTORATION
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AN INTEGRATED APPROACH TO THE CONSERVATION OF A WOODEN SCULPTURE REPRESENTING ST. VINCENT DE PAUL (18TH) IN THE DIOCESAN MUSEUM OF PALERMO

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ABSTRACT

Object of this study is a polychrome wooden sculpture dating from the 18th century, representing St. Vincent de Paul (Fig. 1) and belonging to Diocesan Museum of Palermo. The aim of this research was to learn more about the work, structure, material and state of conservation about this artwork, before starting the conservation work. The sculpture was also investigated in order to characterize the overpaint applied during a previous intervention that might be dated approximately to the last century. The sculpture was investigated using several techniques UV, SEM/EDS, XRF, FTIR, RX and medical computed tomography (CT).

Keywords: wooden sculpture, SEM/EDS, XRF, Diocesan Museum of Palermo

INTRODUCTION

Analytical studies today are a common, even indispensable, complement to any research concerning heritage. All steps of the conservation work, from the preliminary study to the choice of materials used, have been accompanied and supported by diagnostic and scientific analysis. These techniques were combined with other specific tests in order to provide a wealth of information about different aspects of the execution: structure, materials employed, number of elements, assembly systems, manufacturing stages, etc. The results of the analysis were compared to the historical-artistic surveys and the resulting data were important in proposing the dating of the artifact. *St. Vincent de Paul* is a polychrome wooden sculpture of unknown author (probably local production), dating to the first half of the eighteenth century and stored in the deposits of the Diocesan Museum of Palermo (Fig. 1). It is a medium size wooden sculpture (h 151 cm, w 53 cm, d 43 cm), carved in the round, obtained from a single full trunk and other smaller wood blocks assembled with glue and nails. The sculpture is probably made by cypress wood. Sculpture's eyes are glass made, according to a 17th and 18th century typical technique as evidenced during additional research about this sculpture [1]. The wood was carved out to make room for the eyes, which were secured to the head with putty. After carving, a preparatory layer was

generally applied to the support in order to achieve a suitable ground for applying the base layer of primer and the pictorial layer [2]. As analytical data and observation suggest, preparatory layer is not extended over the whole surface, and part of the paint layer is directly spread on the wood. The preparatory layer is yellow and it appears of variable thickness depending on the analysis point; it is probably applied with a brush over one or at most two coats. The sculpture was examined using UV radiations that allowed identifying overpaintings. In order to evaluate the state of conservation of the sculpture and the technique employed to construct the support, computer tomography study was performed. Scanning electron microscopy, combined with energy dispersive X-ray analysis, (SEM/EDS), as well as FT-IR spectroscopy, was used to determine the material composition. XRF analysis was applied for implementing identification of the detected pigments. All experimental data and analysis allowed us to obtain exclusive informations that confirm the singularity of the sculpture in relation to similar artworks.

MATERIALS AND METHODS

Multispectral and non-invasive investigation techniques like photography, close-up photography and microphotography under UV and visible radiation (raking light) were chosen as informative

first-step analyses. Specifically photography and close-up photography under UV and visible radiation were performed, using a digital reflex (DRLR) photo camera (Canon Eos 700 D) with a Hybrid CMOS AF image sensor and a resolution of 18 megapixels; to take pictures a 18–55 mm f/3.5–5.6 IS STM lens was used. X-ray fluorescence (XRF) spectroscopy was performed in situ using a portable ASSING Lithos 3000, in a no-contact configuration; 9 points were analyzed, allowing the identification of the different pigments present on the surface of the sculpture. Optical microscopic observation was carried out on 2 swab-samples executed on the artwork's surface and on wood's holes using a Optical microscope Leica 40x. Microsamples, representing all the layers, were gathered taking into account both the laboratory technique requirements and the respect of the work of art. The descriptions of their colour, typology and location are given in Table 1. Wood samples were collected from below the sculpture's base and from the backside of the sculpture (SFN2A, SFN2B) in order to characterize the preparatory layer's materials and the black surface of pictorial layer. The elemental analysis by SEM-EDS measurements was carried out on these samples using a Philips Quanta FEI 200 Environmental Scanning Electron Microscope (ESEM) equipped with an energy dispersive X-ray spectrometer (EDS) by Link Analytical Oxford (Link, UK), model 6103. A Fourier transform infrared spectrometer (Perkin Elmer, FT-IR Spectrum One) was used to perform compositional analysis: samples of preparatory layer were powdered, homogenised and analyzed as KBr pellets (KBr from Sigma Aldrich). The transmittance percentage was collected using CsI windows in the range of 4000–350 cm^{-1} with 4 cm^{-1} resolution, 64 scan.

RESULTS

The characterization of the constitutive materials, the executive techniques, the state of preservation and the previous treatments, was obtained by analyzing pictorial and preparatory layers, wood's samples and putty, combining the results obtained by different techniques. Sculpture's surface was carefully observed under raking light and under ultraviolet radiation before and after the cleaning intervention in order to obtain information about the executive techniques and the state of preservation [3]. Thanks to a first observation, it has been possible recognizing the woodworking tools used by the artist, and the materials's stratigraphy. UV observations were useful for locating overpaint, and the different materials,

through the different fluorescence referring to their composition (data not shown). SEM-EDS analysis's results, combined with XRF data, show the composition of the preparation and the pigments (Tab. 1). The preparation layer (ground materials and binding medium) is composed of gypsum and animal glue, according to the traditional technique. Yellow colour is obtained using ochre ground, mixed to the preparation. SEM-EDS spectra give evidence for Ca and S, as well as Si, Fe, Mg and Al attributed to the ochre ground (Fig. 2). The same outcome resulted by XRF analysis on SV3 and by FTIR analysis on SFN2A, that showed the stretching and bending absorptions of SO_4^{2-} groups at 1185, 1098 and 666 cm^{-1} , the hydration's water (ν O–H at 3407, 3482 3549 cm^{-1} and δ O–H at 1682 and 1620 cm^{-1}) and the proteins bands (broad band centred at 3308 cm^{-1} attributed to stretching ν N–H, 1654 cm^{-1} stretching ν C=O amide I and 1518 cm^{-1} bending δ N–H amide II) [4]. Pigments identification was carried out using a XRF analysis. In each pigments spectrum it is clear the presence of lead, suggesting that all pigments are mixed with white lead probably to give more consistence to the painting. According to obtained data, it can be assessed that the artist used white lead for the collar (Pb), Sienna for brown hair (Fe, Mg, Al), cinnabar (Hg) and white lead for flesh tone and black pigment Pb-based, probably PbS, for the black dress. Also SEM-EDS spectra, performed on SFN2B sample, confirmed the use of PbS as black pigment. The appearance of elements as Fe, Zn, and Cu on SV8 sample (blue tear on eyelid) is indicative of not original layers and overpainting composed, for example, by Prussian blue, and synthetic dye copper-phthalocyanine-based.

CAT analysis allowed to identify substrate characteristics and their structural assemblage such as type of fixings (nails: modern-old) or dowels, further the number of wood blocks used, and the techniques used for the realization and the insertion of the glass eyes. Part of the research was focused on the use and on the technique of glass eyes that were very common on the devotional wooden sculpture since the 17th century. Besides, CAT analysis allowed identifying possible damage to the support and to the decorative layers, caused by the movement of the wood and leading to pictorial layer losses.

CONCLUSIONS

The physical-chemical and analytical investigations carried out in this study allowed for characterizing the materials employed and manufacturing stages for the realization of the wooden sculpture

representing St. Vincent de Paul as well as an evaluation of its state of conservation and a recognition of previous treatments. The obtained results suggest traditional manufacturing techniques (carving, *ammannitura*) but, at the same time, some particularity as the use of a large number of wooden inserts, the no-emptying of the trunk, the use of yellow colour preparation and the partial draft of the paint layer directly on the wood. However, according to the historical-artistic surveys, the data suggest the first half of the eighteenth century as creation dating; therefore, it is possible to assert that this sculpture is probably one of the oldest *St. Vincent de Paul*'s representations in Sicily.

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Fig. 1 – St. Vincent de Paul, unknown artist, first half of the eighteenth century, Diocesan Museum of Palermo

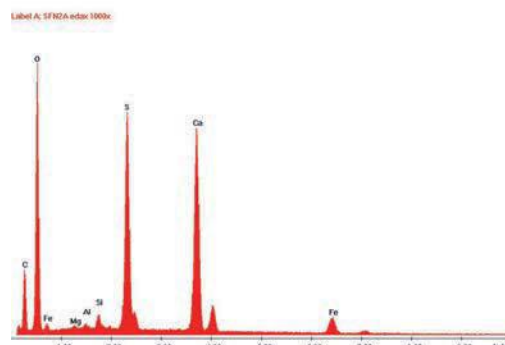


Fig. 2 – SEM-EDX spectrum of sample SFN2A referred to the preparatory layer

Sample name	Colour and description	Sampling details	Type of analysis	Results of analyses										
SFN3	Wood original sample	Below the base	OM Observation	Cypress.										
SFN4	Wood sample (not original)	Right knee	OM Observation	White fir.										
SFN2A	Yellow preparatory layer	Backside, near lacuna at the center	SEM-EDS FTIR	SEM-EDS										
				C	O	Mg	Al	Si	S	Ca	Fe			
				13.9	29.4	0.1	0.2	0.7	14.9	28.5	12.4			
				FT-IR		(SO ₄ ²⁻): 1185, 1098, 666 cm ⁻¹ ; ν(O-H): 3407, 3482, 3549 cm ⁻¹ ; δ(O-H):1682,1620 cm ⁻¹ ; Proteins bands: 3308 cm ⁻¹ stretching ν N-H, 1654 cm ⁻¹ stretching ν C=O amide I and 1518 cm ⁻¹ bending δ N-H amide II								
SFN2B	Preparatory layer and black pigment	Backside, near lacuna at the center	SEM-EDS	SEM-EDS										
				C	O	Mg	Al	Si	S	Ca	Fe	Cl	Pb	
				26,9	15.2	0.2	0.4	0.8	5.8	2.8	0.6	1.1	45.8	
SV1	Preparatory layer and black pigment	Left side	XRF	XRF										
				C	O	Mg	Al	Si	S	Ca	Fe	Cl	Pb	
				---	---	---	---	---	---	8,4	0,8	---	90,6	
SV3	Yellow preparatory layer layer	Cape right side	XRF	XRF										
				C	O	Mg	Al	Si	S	Ca	Fe	Cl	Pb	
				---	---	---	---	---	---	44,5	13,5	---	41,8	
SV4	Preparatory layer and white pigment	Collar backside	XRF	XRF										
				C	O	Mg	Al	Si	S	Ca	Fe	Cl	Pb	
				---	---	---	---	---	---	1,1	0,4	---	98,4	
SV6	Preparatory layer and pink-incarnate pigment	Face	XRF	XRF										
				C	O	Mg	Al	Si	S	Ca	Fe	Hg	Pb	
				---	---	---	---	---	---	2,5	1,5	2,9	92,8	
SV7	Putty of not original eyelids and brown pigment	Right eyelid	XRF	XRF										
				C	O	Mg	Zn	Si	Ti	Ca	Fe	Hg	Pb	
				---	---	---	1,3	---	15,9	59,9	3,2	0,1	19,3	
SV8	Putty of not original eyelids and blue (tear) and brown pigment	On the right eyelid	XRF	XRF										
				C	Cu	Mg	Zn	Sr	Ti	Ca	Fe	Hg	Pb	
				---	5,6	---	2,4	2,3	18,9	57,3	10,2	0,1	3,1	

Tab. 1 – Samplings and overall results of analysis